This paper will present application of the double-moment bulk warm-rain microphysics scheme of Morrison and Grabowski to the simulation of a field of shallow convective clouds. The key components of the scheme are: i) prediction of the cloud and rain drop concentrations in addition to the prediction of the mixing ratios; ii) prediction of the in-cloud supersaturation field; and iii) representation of various subgrid-scale mixing scenarios associated with the evaporation of cloud water due to entrainment. Prediction of the supersaturation field allows secondary in-cloud activation of cloud droplets above the cloud base. Pristine and polluted aerosol environments conditions are contrasted.

Numerical simulations show that about 40\% of cloud droplets originates from CCN activated above the cloud base. As a result, the mean cloud droplet concentration is approximately constant with height in agreement with aircraft observations and in contrast to simulations where the activation above the cloud base is disabled. The in-cloud activation significantly affects the vertical distribution of the effective radius and thus the mean albedo of the cloud field. The differences between pristine and polluted conditions are consistent with the previous modeling studies, but the impact of the subgrid-scale mixing scenario is significantly reduced. Possible explanations of the latter involve a combination of numerical and physical aspects that will be discussed at the meeting. These results will be presented in the context of recent observational and modeling studies concerning indirect aerosol effects in shallow convective clouds.